

Assignment 3

Due: Oct 23rd, 2018 at 1:59 pm

Question 1: Self-defined function and Quantmod (70 Points)

Assuming you want to invest some money into the equity market. Before you buy any equity, you may want to analyze the equity performance. In this question, you will build a function to analyze 10 equities with 1 year length of data, and generate a table report in the end. (Equity selection is made by yourself.)

For this self-defined function, you should have three input variables, they are:

- Equity ticker
- Start date
- End date

The output of this function should be a table, which includes following information.

- Ticker name
- Skewness and kurtosis
- Stationary test result (Shown with True or False values)
- Normality test result (Shown with True or False values)

In order to obtain the desired report, you can following these steps:

1. Use quantomod package to download daily equity data. The ticker name, start date and end date should be assigned by the self-defined function.
2. Calculate the return for each equity. You can use either simple return or log return. However, you are required to calculate it using the definition rather than functions from the quantomod.
3. Calculate the skewness and kurtosis based on the return.
4. Perform Stationary test for your data and report True or False
5. Perform Normality test for your data and report True or False

In financial market, high kurtosis indicates more risk in investments. Based on your report, sort the ticker name based on kurtosis values from low to high. Which equity has the lowest kurtosis? For this equity, does it has heavy tail or short tail? Why?

Bonus question (30 Points)

In Question 1, the most straight forward method is downloading the ticker one by one and calculate corresponding values. To do this, you may need to use for loop in calculation.

For this bonus question, please use apply functions to replace for loops.

You can apply the requirement from Bonus question to Question 1 directly. Thus, you don't need to do the same question twice.

Question 2: Intro to HFT (30 points)

Use BA.csv from previous homework, this time let's do something new

- Read AAPL.O.csv, this time I need you to subtract all Trade information
- Divide your data set into 5 minutes time interval. For example, 9:30 - 9:35, 9:35 - 9:40, ...
In total, you should have 78 time intervals.
- For each time interval, record the first trade price as p_s , the last trade price as p_e . Use p_s and p_e to calculate return (either type). Save all the returns into a vector.
- Is this return sequence stationary? Is this return sequence Normal distributed?